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THE HERBARIA OF NEW ENGLAND.

MARY A. DAY.

WITH the increasing interest in our local flora and its investigation so much stimulated of late by activities of the New England Botanical Club, frequent questions have arisen concerning the exact position, extent, and accessibility of the historic herbaria in this region. Many of these, as the repositories of specific and varietal types, and as the basis of published papers, have, of course, a considerable importance in the scientific investigation of our flora. It is, however, surprisingly difficult to locate the herbaria of some of those collectors whose names and work are familiar to every serious student of New England botany. This is especially true of the amateur collections, for these, at the death of the owner, often change hands several times, remaining intact or being variously divided, before they are finally incorporated in the larger herbaria of some public museum or educational institution. At the suggestion of several New England systematists the writer began more than a year ago to collect for publication in RHODORA data regarding New England herbaria. The work involved a rather extensive correspondence and as it progressed materially increased in interest. Every effort has been made to render the following accounts accurate in details and to this end information has been derived so far as possible from official sources, that is, from the owners or those in charge of the different herbaria. To these persons the author is much indebted for their uniform kindness in replying to inquiries. Absolute completeness however, can hardly be attained in any such presentation and it need scarcely be said that supplementary information will be gladly received.

Many of the herbaria here mentioned are private collections, not open to consultation except through the courtesy of their owners,—a quality of which, happily, there is likely to be no lack where earnest scientific work is concerned.

For ready reference the herbaria are here arranged alphabetically.

Alstead School of Natural History, ALSTEAD, NEW HAMPSHIRE.—Two years ago the Alstead School started a collection of the plants growing within a radius of fifteen miles from Alstead Centre. This tract includes portions of Cheshire and Sullivan Counties, New Hampshire, as well as Windham and Windsor Counties, Vermont. The specimens which are mostly mounted and organized represent chiefly the phaenogams, pteridophytes, and fleshy fungi. The herbarium is accessible only during the session of the School, which occurs in midsummer. The plants are in charge of Messrs. M. L. Fernald and Hollis Webster of Cambridge, Massachusetts. Most of the flowering plants and ferns are exactly duplicated in the herbarium of the New England Botanical Club, and many of the fungi in the collection of the Boston Mycological Club.

Ames, Oakes, NORTH EASTON, MASSACHUSETTS.—The most important part of Mr. Ames's herbarium consists of the collection of orchids of the world which he commenced in 1899, and which now numbers about 1300 sheets. He also has a collection of the garden hybrids of orchids in which the genus *Cypripedium* alone includes about 400 sheets containing many very valuable specimens. In 1893 Mr. Ames began a collection of the plants of North Easton, Massachusetts, which has increased to 600 specimens, collected chiefly by himself.

Amherst College, AMHERST, MASSACHUSETTS.—The Amherst College herbarium contains about 12000 sheets of which some 2000 sheets represent European species and the remaining 10000 American; the latter exhibiting chiefly the flowering plants from that part of the United States east of the Mississippi River. Dr. Edward Hitchcock's collection containing plants of local interest, many of which are no longer found growing in the vicinity, is a part of this herbarium. This collection is in charge of Professor J. M. Tyler.

Andrews, Luman, SOUTHTON, CONNECTICUT.—About fifteen years ago Mr. Andrews commenced his collection of plants and

since that time he has accumulated about 2400 sheets of specimens of flowering plants and higher cryptogams, of which a small part are European and the rest from the United States. Mr. Andrews has collected extensively in Southington and its vicinity, and from an area of 36 square miles has 1050 species. His list of plants growing upon the summit of Meriden Mountain is based on specimens in his herbarium.

Arnold Arboretum, see Harvard University.

Bailey, William Whitman, PROVIDENCE, RHODE ISLAND.—Professor Bailey's private collection numbers about 3000 sheets of which nearly half are unmounted. It is arranged by orders according to Bentham & Hooker's *Genera Plantarum* but the genera under each order are alphabetical. It contains valuable specimens from Stephen Thayer Olney, George Thurber, George Hunt, etc., and is especially strong in *Umbelliferae*, *Compositae*, *Labiatae*, *Carex* and *Filices*.

Barratt, Joseph, see Wesleyan University.

Bates College, LEWISTON, MAINE.—The nucleus of this herbarium was gathered many years ago by the late Dr. Aaron Young, who was an enthusiastic botanist connected with one of the early geological surveys of Maine. After the death of President Chadbourne of Williams College his herbarium was purchased and presented to Bates College by a patron of the institution. The Chadbourne herbarium contains not only his own collections but Asa Gray's North American *Gramineae* and *Cyperaceae*, Charles Wright's Cuban plants, Chester Dewey's *Carices*, Hall & Harbour's plants of the Rocky Mountains, together with many of C. C. Parry's plants and of Ravenel's Carolina *Fungi*. O. R. Willis's New Jersey plants are also at Bates College. Mr. Fred. E. Pomeroy now has charge of this herbarium.

Bennett, James Lawrence, see Brown University.

Bishop, James Nathaniel, PLAINVILLE, CONNECTICUT.—About 1870 Mr. Bishop began his collection of plants and has added to it year by year until he now has between 5000 and 6000 specimens. Besides those of his own preparation he has specimens collected by Dr. J. W. Robbins, Dr. H. C. Bennett, and A. H. Curtiss of Florida; *Potamogetons* from Dr. Morong and *Cyperaceae* and *Gramineae* from Elihu Hall. The New England ferns are well represented. The specialty of his herbarium is the representation of the plants of

Connecticut which forms in great part the basis of his catalogues of the state flora.

Bissell, Charles Humphrey, SOUTHTINGTON, CONNECTICUT. — Mr. Bissell's herbarium, collected during the last ten years, consists of about 6000 specimens of phaenogams and ferns, the larger part being from New England. The flora of Connecticut is very fully represented and an effort has been made to show the distribution of the plants in the state. It is especially strong in the *Labiatae* and *Cyperaceae*.

Blake, Joseph, see University of Maine.

Bolles, William P., see Massachusetts College of Pharmacy.

Boott, William, see Harvard University, Gray Herbarium.

Boston Mycological Club, MR. HOLLIS WEBSTER, CORRESPONDING SECRETARY, CAMBRIDGE, MASS.—This Club was organized in 1895 and soon began a collection, but for two years little was accomplished. During the last three years, however, large additions have been made by active members of the Club and these increase more rapidly than, with the present resources, they can be organized. The botanical range of the herbarium is at present nearly confined to the *Hymenomycetes*, *Gastromycetes*, and *Discomycetes*. It is the intention of the Club to make its collection represent the fungus-flora of all New England so far as the groups above mentioned are concerned. At present, however, the collections are chiefly from eastern Massachusetts. The herbarium is now located in the rooms of the Cambridge Botanical Supply Company, 1286 Massachusetts Avenue, Cambridge, Mass.

Boston Society of Natural History, BOSTON, MASSACHUSETTS.—The herbarium of this Society is in charge of Miss M. E. Carter, Curator. In the general collection of plants are about 40000 specimens of both phaenogams and cryptogams from all parts of the world. The herbarium of Benjamin D. Greene formed the nucleus; among other collections here are Texano-Mexican plants of Charles Wright (collections of 1849, 1852) and of Ferdinand Lindheimer; A. Fendler's plants of New Mexico and Venezuela; Charles W. Short's plants of Kentucky; H. N. Bolander's Californian plants; an admirable suite of the plants secured on the Sir John Franklin Arctic Expedition; also miscellaneous plants from H. P. Sartwell, John Carey, A. W. Chapman and Chester Dewey. The New England herbarium contains about 7000 sheets of both

phaenogams and cryptogams, including the fullest set of William Oakes' plants which were distributed after his death. The Lowell herbarium, given to the Society by John Amory Lowell, numbers about 18000 sheets, among which are the following collections: Mary Wight's Algae and the invaluable Thomas Taylor and C. J. Sprague collections of lichens, as well as some of W. S. Sullivan's mosses. The Lowell herbarium is preserved intact and is still arranged according to the system of Endlicher's *Genera Plantarum*.

Bowdoin College, BRUNSWICK, MAINE.—The herbarium of Bowdoin College, now in charge of Professor L. A. Lee, is inaccessible for reference, being mostly unmounted and without special arrangement. It contains many specimens of plants collected by Rev. Joseph Blake, but the most important portion of the herbarium is probably the plants collected on the early surveys of Maine.

Brace, John Pierce, see Williams College.

NOTES ON A COLLECTION OF CRATAEGUS MADE IN THE PROVINCE OF QUEBEC NEAR MONTREAL.

C. S. SARGENT.

THE following notes are based on collections made by Mr. J. G. Jack, principally in 1899 and 1900, in the neighborhood of the Lachine Rapids of the St. Lawrence River. The region which has been particularly examined by Mr. Jack is on both banks of the Rapids, and south of the River extends from a point just below them up the River for a distance of fifteen miles and back from the River for about ten miles. The country is here broken into rough rocky limestone ridges, which have been principally cleared of their original forests and are now largely covered with thickets of Thorns, Wild Apples, Plums and Wild Cherries. In addition to the following species, which can be distinguished in Mr. Jack's collections, are probably a number of others in the group of the *Tenuifoliae*. These, however, cannot be satisfactorily characterized until the plants can be more fully studied in the field than has been possible up to this time.

CRUS-GALLI.

CRATAEGUS CRUS-GALLI, Linnaeus, Chateaugay, *J. G. Jack*, August, 1892, May and August, 1899.

PUNCTATAE.

CRATAEGUS PUNCTATA, Jacquin, Province of Quebec, *J. G. Jack*, Sept. 1887, St. Helen's Isle, opposite Montreal, August, 1892, Levis, Sept. 1900, Montmorency Falls, August 1895.

Crataegus suborbiculata. Glabrous with the exception of a few short caducous hairs near the base of the upper surface of the pale yellow-green unfolding leaves and below in the axils of their veins. Leaves semiorbicular, particularly on leading shoots, to oval or rarely oblong, short-pointed at the apex, rounded and more or less decurrent at the base on the slender grooved slightly glandular petioles, mostly slightly divided above the middle into three or four pairs of short acute lobes, doubly and sharply glandular-serrate except toward the base, thin and firm in texture, dark dull green above, paler below, about $1\frac{1}{2}$ in. long and broad, or on leading shoots occasionally twice as large, the slender midribs and remote primary veins deeply impressed above; petioles from $\frac{3}{8}$ to 1 in. in length; stipules linear-lanceolate, coarsely glandular-serrate, $\frac{1}{3}$ to $\frac{1}{2}$ in. long. Flowers $\frac{3}{4}$ in. in diameter on short stout pedicels in compact compound 6-12-flowered thin-branched cymes; bracts and bractlets linear, finely glandular-serrate, caducous; calyx-tube broadly obconic, the lobes lanceolate, acuminate, entire or occasionally obscurely denticulate, reflexed after anthesis; stamens 20; filaments stout, elongated; anthers small, rose-colored, fading dark purple; styles 5, surrounded at the base by a broad ring of hoary tomentum. Fruit in few-fruited erect clusters on short rigid peduncles, subglobose but often rather longer than broad, $\frac{5}{8}$ in. in diameter, dull red, more or less blotched with green and often entirely green on one face; calyx enlarged, persistent, with a broad, deep cavity, the lobes linear-lanceolate, abruptly narrowed from broad bases, dark red on the upper side, nearly entire, wide-spreading and often closely appressed, usually persistent; flesh yellow, thin, dry and hard; nutlets 5, broad and thick, slightly and irregularly grooved on the back, about $\frac{1}{4}$ in. long.

A tree rarely more than 15 or 16 feet in height with a well developed trunk 6 or 8 in. in diameter covered with pale gray scaly bark, stout wide-spreading branches forming a low flat-topped head, and stout slightly zigzag branchlets marked by small lenticels, lustrous and bright orange-brown for one or two seasons, finally dull ashy gray, and armed with straight slender chestnut-brown lustrous spines from 1 to 2 in. in length.

Flowers during the first week in June. Fruit ripens after the first of October, and falls without becoming mellow.

Low rocky limestone ridges, *J. G. Jack*, Caughnawaga, August 29, 1899, May and September, 1900, Rockfield, May and September, 1900.

MOLLES.

***Crataegus Canadensis*.** Leaves ovate, short-pointed broadly cuneate, or on leading shoots truncate at the base, slightly lobed usually only above the middle with short broad acute lobes, coarsely and frequently doubly serrate often to the base with spreading glandular teeth; in early spring coated above with soft white hairs and below with dense hoary tomentum; at maturity thin and firm, blue-green, glabrous or scabrate on the upper surface, paler and pubescent on the lower surface particularly along the slender midribs and thin nearly straight primary veins running to the points of the lobes, 2 to $2\frac{1}{2}$ in. long, $1\frac{1}{2}$ to nearly 3 in. wide; petioles slender, often slightly winged above, deeply grooved, conspicuously glandular with stipitate dark glands, tomentose or finally nearly glabrous, from $\frac{3}{4}$ to 1 in. in length; stipules linear, minutely glandular-serrate, from $\frac{1}{2}$ to $\frac{3}{4}$ in. long, caducous. Flowers $\frac{3}{4}$ in. in diameter, in broad loose compound thin-branched tomentose many-flowered cymes; bracts and bractlets linear-lanceolate, glandular-serrate, dark red in fading; calyx-tube broadly obconic, villous with long matted white hairs, the lobes lanceolate, acuminate, glandular with large red stipitate glands, villous on both surfaces, reflexed after anthesis; stamens 20; filaments slender; anthers small, nearly white; styles 5, surrounded at the base by a thin ring of pale tomentum. Fruit in erect thick-stemmed slightly villous clusters, short-oblong to subglobose, crimson, lustrous, marked by large pale lenticels, slightly villous at the ends, from $\frac{1}{3}$ to $\frac{1}{2}$ in. long, about $\frac{1}{8}$ in. thick; calyx-tube prominent with a broad, deep cavity, the lobes gradually narrowed from their broad bases, glandular, villous, spreading and reflexed, or often deciduous before the ripening of the fruit; flesh yellow, thin, dry and mealy; nutlets 5, thin, irregularly ridged on the back, about $\frac{1}{4}$ in. long.

A tree 18 to 20 feet in height with a trunk 6 or 8 in. in diameter, spreading branches forming a broad round-topped head and zigzag branchlets marked by large oblong pale lenticels, dark green and coated when they first appear with matted white hairs, becoming light orange-brown and very lustrous during their first season and ashy gray in their third year, and armed with stout straight or slightly curved lustrous chestnut-brown spines from 2 to $2\frac{1}{2}$ in. long.

Flowers at the end of May. Fruit ripens after the first of October.

Rocky limestone ridges, *J. G. Jack*, Chateaugay and Caughnawaga, October, 1899, May and September, 1900.

In its 20 stamens *Crataegus Canadensis* resembles *C. mollis*, Scheele, of the Mississippi valley and the type of the group. It differs from it in the color of the branchlets, in the smaller flowers, in the much smaller late-ripening fruit, and in the shape, size and texture of the leaves. The other species of this group which have been found in the Province of Quebec and the Atlantic States have 10 never 20, stamens.

CRATAEGUS CHAMPLAINENSIS, Sargent (*RHODORA*, iii. 20), *J. G. Jack*, Chateaugay, August, 1899, September, 1900, Adirondack Junction, October, 1899, May and September, 1900.

CRATAEGUS SUBMOLLIS, Sargent (*Bot. Gazette*, xxxi. 7), Province of Quebec, *J. G. Jack*, Chateaugay, May and August, 1899, Rockfield, May, 1900, Caughnawaga, May and September, 1900, Montmorency Falls, September, 1900.

Crataegus anomala. Leaves ovate, acute, divided above the middle into 5 or 6 pairs of short acute or acuminate lobes, coarsely doubly serrate with spreading gland-tipped teeth except at the broadly cuneate or occasionally rounded base; as they unfold conspicuously plicate, scabrate above with short appressed white hairs, villose below particularly on the slender midribs and thin primary veins arching to the points of the lobes and only slightly impressed above, and at maturity membranaceous, yellow-green and glabrous on the upper surface, paler and villose below, $2\frac{1}{2}$ to 3 in. long, 2 to 3 in. wide; petioles stout, slightly grooved and glandular on the upper side with scattered dark glands, $\frac{3}{4}$ to 1 in. long; stipules linear-lanceolate, or on vigorous shoots falcate and very oblique at the base, conspicuously glandular-serrate, often $\frac{1}{2}$ in. in length. Flowers $\frac{1}{2}$ in. in diameter on elongated slender pedicels, in broad loose compound 10-12-flowered thin-branched villose cymes; bracts and bractlets lanceolate to oblanceolate, finely glandular-serrate; calyx-tube narrowly obconic, densely villose with long matted pale hairs, the lobes lanceolate, acuminate, coarsely glandular-serrate, pubescent on the lower surface; stamens usually 10, occasionally 7 or 8; filaments slender; anthers large, rose-color or red; styles 4 or 5, surrounded at the base by a thin ring of pale tomentum. Fruit pendant in loose slightly villose clusters, obovate to oblong, gradually narrowed to the rounded base, crimson, lustrous, marked by large pale scattered lenticels, slightly villose toward the full and rounded apex, from $\frac{5}{8}$ to $\frac{3}{4}$ in. long, $\frac{1}{2}$ in. thick; calyx large and prominent, with a broad and shallow cavity, the lobes elongated, lanceolate, abruptly narrowed from broad bases, dark red on the upper side, tomentose, finely glandular-serrate, spreading and closely appressed, often deciduous before the ripening of the fruit; flesh light yellow, thin, rather juicy; nutlets 4 or 5, thin, prominently and irregularly ridged on the back, $\frac{1}{4}$ to $\frac{5}{16}$ in. in length.

A bushy intricately branched tree from 15 to 18 feet in height with a short trunk 6 in. in diameter and slender slightly zigzag branchlets marked by numerous oblong pale lenticels, dark green and villose when they first appear, bright red or orange-brown and lustrous during their second season, orange-brown during their third year, and armed with slender straight or slightly curved spines rarely more than $1\frac{1}{4}$ in. in length.

Flowers during the last week of May. Fruit ripens after the first of October.

Low limestone rocky ridges near the banks of the St. Lawrence River in the Caughnawaga Indian Reservation, opposite Lachine, *J. G. Jack*, May and September, 1900.

From all other species of the *Mollis* group *Crataegus anomala* may be distinguished by the rose-colored or red anthers, the other species having, so far as they have been observed, light yellow or nearly white anthers.

FLABELLATAE.

CRATAEGUS FLABELLATA, Spach, La Tortue, *J. G. Jack*, May and October, 1900, Caughnawaga, May and September, 1900.

First described from plants cultivated at the Jardin des Plantes in Paris and known only in the descendants of these plants in European gardens, *Crataegus flabellata* appears to have been first discovered in a wild state by Mr. Jack. A tall shrub, well distinguished by the long acute spreading lobes of the leaves, by the large flowers with 20 stamens and pink anthers, and by the small oblong late-ripening fruit.

Crataegus densiflora. Leaves oval to ovate, acute or short-pointed at the apex, broadly cuneate or occasionally rounded at the base, laciniately cut above the middle into numerous short narrow acuminate spreading lobes, crenulate-serrate, the small teeth tipped with bright red glands; covered in early spring on the upper surface with soft white caducous hairs, glabrous on the lower surface, and at maturity thin but firm in texture, dark dull green and smooth above, pale yellow-green below, 2 to 3 in. long, $1\frac{1}{2}$ to 2 in. wide, with slender midribs only slightly impressed above and thin primary veins arching to the points of the lobes; petioles slender, glandular, more or less winged above on vigorous leading shoots, from 1 to $1\frac{1}{2}$ in. long; stipules narrowly obovate to linear lanceolate, finely glandular-serrate, $1\frac{1}{2}$ in. long, caducous. Flowers $\frac{1}{2}$ in. in diameter, on slender elongated pedicels in very compact narrow thin-branched tomentose or villose many-flowered cymes; bracts and bractlets finely glandular-serrate, caducous; calyx-tube narrowly obconic, glabrous, the lobes lanceolate, glandular with bright red glands, glabrous on the outer surface, densely villose on the inner surface, reflexed after anthesis; stamens usually 10, sometimes 5 to 10; filaments slender; anthers small, pale red or pink; styles 3 or 4, surrounded at the base by a thick ring of hoary tomentum. Fruit in erect slightly villose few fruited clusters, oblong, dark crimson or purplish, covered with a pale bloom, marked by large scattered lenticels, about $\frac{3}{8}$ in. long, nearly $\frac{1}{2}$ in. wide; calyx cavity narrow,

not deep, the lobes elongated, villose above, closely appressed or occasionally erect and incurved; flesh yellow, thin, sweet, soft and pulpy; nutlets 3 or 4, thick, very prominently ridged on the back, about $\frac{3}{16}$ in. long.

A shrub often somewhat fastigiate in habit with slender erect stems 12 or 15 feet in height, and slender glabrous only slightly zigzag lustrous branchlets marked by oblong orange-colored ultimately gray lenticels, dark yellow-green when they first appear, light chestnut-brown and very lustrous during their first season, often becoming orange-brown during their second year and finally ashy gray, and armed with stout or slender straight or slightly curved bright chestnut-brown spines from 1 to $1\frac{1}{2}$ in. long.

Flowers from the 20th to the end of May. Fruit ripens from the first to the middle of September and often remains on the branches until early in October.

Rocky Limestone ridges, *J. G. Jack*, Rockfield, August 25, 1899, May and September, 1900, La Tortue, September and October, 1899, May and October, 1900, Caughnawaga, May and September, 1900.

CRATAEGUS HOLMESIANA, Ashe (Sargent, Bot. Gazette, xxxi. 10), *J. G. Jack*, Chateaugay, August, 1894, Rockfield, July, 1899, May, 1900, Caughnawaga, September, 1899, May, 1900, Beauharvois, May, 1900. Also Lower Andoise, Cape Breton Island, *W. Faxon*, August, 1892, near Toronto, where it is probably common, *D. W. Beadle*, 1899.

TENUIFOLIAE.

CRATAEGUS ACUTILOBA, Sargent (RHODORA, iii. 23), Province of Quebec, *J. G. Jack*, Montmorency Falls, August 20, 1895, September, 1900, Adirondack Junction, May and August, 1899, Rockfield, September, 1900, Island of Orleans, September, 1900, Levis, September, 1900.

CRATAEGUS PASTORUM, Sargent (RHODORA, iii. 24), *J. G. Jack*, Caughnawaga, August, 1899, Montreal, West, May and September, 1900, Adirondack Junction, September and October, 1900.

CRATAEGUS SCABRIDA, Sargent (RHODORA, iii. 29), *J. G. Jack*, Caughnawaga, August, 1899, Rockfield, May and September, 1900, Adirondack Junction, September, 1900.

DILITATAE.

CRATAEGUS DILITATA Sargent (Bot. Gazette, xxxi. 9), *J. G. Jack*, Caughnawaga, May and September, 1900.

TOMENTOSAE.

***Crataegus Laurentiana*.** Leaves oblong to oblong-obovate, acute or acuminate at the apex, gradually or abruptly narrowed from near the middle to the base, divided above, occasionally often deeply on vigorous leading shoots, into four or five pairs of narrow acute lobes, sharply and often doubly glandular-serrate except toward the base; in early spring yellow-green and roughened above by short appressed pale hairs and villose along the veins below with scattered white hairs, and at maturity subcoriaceous, dark green and glabrous on the upper surface and paler on the lower surface, with stout midribs and slender remote primary veins running to the points of the lobes and rarely slightly hairy below, 2 to $2\frac{1}{2}$ in. long, 1 to 2 in. wide; petioles stout, more or less broadly winged above, deeply grooved, glandular with small dark mostly deciduous glands, villose in spring, ultimately glabrous, often dark red after midsummer like the lower side of the midribs of the leaves of leading shoots, $\frac{1}{2}$ to 1 in. long; stipules lanceolate to oblanceolate, finally glandular-serrate, bright red in fading, $\frac{1}{3}$ to $\frac{1}{2}$ in. long. Flowers $\frac{3}{8}$ in. in diameter on elongated slender pedicels in broad loose many-flowered thin-branched compound huey corymbs; bracts and bractlets linear, finally glandular-serrate, bright red before falling, caducous; calyx-tube broadly obconic, coated at the base with long matted pale hairs, nearly glabrous or puberulous above, the lobes narrow, acuminate, conspicuously glandular-serrate, nearly glabrous on the outer surface, villose on the inner surface, reflexed after anthesis: stamens 10; filaments slender; anthers small, pale pink, fading purple; styles 3-5. Fruit in wide thick-branched slightly villose drooping or erect clusters, oblong, dark crimson, from $\frac{1}{3}$ to $\frac{1}{2}$ in. long; calyx prominent with a deep broad cavity and elongated glandular-serrate appressed lobes; flesh thin, yellow, finally becoming sweet and succulent; nutlets 4 or 5, thick and broad, about $\frac{1}{4}$ in. long, prominently ridged on the back with broad rounded ridges, grooved on the inner faces by two shallow irregularly shaped lateral depressions.

A stout much-branched shrub with thick stems 10 to 15 feet high, and stout zigzag branchlets, dark green and coated when they first appear with hoary tomentum, soon becoming glabrous, bright orange-brown and very lustrous during their first season and gray during their second year, and armed with very stout chestnut-brown lustrous spines from 2 to 3 in. long and often pointed toward the base of the branch.

Flowers the first week of June. Fruit ripens at the end of September and shrivels on the branches sometime before falling.

J. G. Jack, Rocky Banks of the St. Lawrence River in the village of La Tortue at the Lachine Rapids, August and October, 1899, May, 1900, and rocky limestone ridges, Caughnawaga, October, 1899, May, 1900.

CRATAEGUS MACRACANTHA, Lindley, *J. G. Jack*, Adirondack Junction, October, 1899, La Tortue, September, 1899, Rockfield, Chateaugay, Isle of Orleans, May and September, 1900, Caughnawaga, May, 1900.

CRATAEGUS SUCCULENTA, Link, *J. G. Jack*, Montreal West, September, 1899, Adirondack Junction, October, 1899, May, 1900, Caughnawaga, 1899, Rockfield, September, 1900; also near Toronto, *D. W. Beadle*, 1899.

Crataegus integriloba. Leaves broadly obovate to oval, cuneate, decurrent and entire at the base, irregularly lacinate above the middle with short acute lobes, coarsely doubly serrate with spreading glandular teeth; in early spring coated with soft pale caducous hairs and at maturity glabrous, thin but firm in texture, dark green and lustrous on the upper surface, pale yellow-green on the lower surface, $1\frac{1}{2}$ to 3 in. long, $1\frac{1}{4}$ to 2 in. wide, with slender midribs and numerous straight primary veins deeply impressed above; petioles stout, grooved, more or less broadly winged above, often bright red on the lower side like the base of the midribs; stipules linear, finely glandular-serrate, villose, light red, $\frac{3}{4}$ to 1 in. long, caducous. Flowers $\frac{3}{4}$ in. in diameter, in compound thin-branched many-flowered villose cymes; bracts and bractlets linear, glandular-serrate, caducous; calyx-tube broadly obconic, coated towards the base with long matted white hairs, glabrous above, the lobes linear-lanceolate, elongated, entire or very rarely furnished with an occasional caducous gland; stamens 10; filaments rather short; anthers large, rose-color; styles 2 or 3, surrounded at the base by a narrow ring of soft white hairs. Fruit in erect or drooping broad loose slightly villose clusters, subglobose, bright scarlet, lustrous, marked by occasional large pale lenticles from $\frac{1}{3}$ to $\frac{1}{2}$ in. in diameter; calyx prominent with a comparatively broad deep cavity, the lobes elongated, entire, dark red on the upper side at the base, strongly reflexed, persistent; flesh thin, yellow, soft, sweet and pulpy; nutlets 2 or 3, about $\frac{1}{4}$ in. long, thick and broad, prominently often doubly ridged on the back, penetrated on the inner faces by two broad deep lateral grooves.

A tree from 12 to 18 feet in height with a straight erect stem 6 or 8 inches in diameter, wide-spreading or erect branches forming an open irregular head and stout only slightly zigzag glabrous branchlets marked by occasional small pale lenticels, very lustrous and red-brown or orange-brown during their first season, later becoming dull ashy gray, and armed with stout usually straight spines varying from $1\frac{1}{2}$ to $2\frac{1}{2}$ in. in length.

Flowers during the first week in June. Fruit ripens at the end of September or early in October.

Low limestone rocky ridges, *J. G. Jack*, Beauharnois, August 24, 1899, Caughnawaga, August 29, 1899, May and October, 1900,

Rockfield, September, 1900, Adirondack Junction, September, 1900.

Well distinguished by its entire calyx-lobes from all the known forms of the small group of species distinguished by the longitudinal grooves on the inner faces of the nutlets, of which *Crataegus tomentosa*, L., is the type.

COCCINEAE.

CRATAEGUS COCCINEA, Linnaeus (Sargent, Bot. Gazette, xxxi, 13), *J. G. Jack*, Caughnawaga, 1899, May, 1900, *J. M. Macoun*, Levis, September, 1900, *A. C. Waghorn*, Newfoundland, where it is probably the only species. Common on the coast of Maine and to be looked for in the coast region of the Maritime Provinces and in the valley of the lower St. Lawrence River.

CRATAEGUS COCCINEA var. *ROTUNDIFOLIA*, Sargent (Bot. Gazette, xxi, 14), *J. G. Jack*, near Montreal, August 19, 1887, Isle of Orleans, August, 1895, September, 1900, Caughnawaga, October, 1899, May, 1900, Adirondack Junction, October, 1899, Chateaugay, October, 1899, May, 1900; *J. M. Macoun*, Levis, September, 1894.

CRATAEGUS PRAECOX Sargent (*RHODORA*, iii, 27), *J. G. Jack*. Chateaugay and Caughnawaga, May and August 1899. May, 1900.

ARNOLD ARBORETUM.

TWO NEW SMUTS ON *ERIOCAULON SEPTANGULARE*.

(Contribution from the Cryptogamic Laboratory of Harvard University, No. 46.)

G. P. CLINTON.

IN November of last year the writer finding some specimens of *Eriocaulon septangulare* With. at Ellis, Massachusetts, took a few of the plants home for herbarium specimens. Examination of the flower-heads a few days later disclosed the fact that the ovaries were infected with a new species of smut belonging to the genus *Tolyposporium*. A visit again to Ellis showed that all of the plants then to be found, several hundred, were infected, so it was merely a question of collecting all of the heads to get the smut in quantity.

The fungus is so inconspicuous that one is not likely to discover it

unless examining the heads with a magnifier. The flowers of this plant are androgynous and it is apparently only in the pistillate ones that the smut is found. The removal of the calyx and corolla of such discloses a greyish oval body one to two millimeters in length. This is the infected ovary and it generally shows distinctly the two lobes. It is completely filled with the spore-balls which are apt to give it a faintly nodulose appearance. The ovary-wall is easily ruptured, the spore-balls falling out and resembling very minute seeds. They are black, perfectly opaque under the microscope, and vary from imperfectly oblong to sub-spherical, generally with sides somewhat angled through pressure. They range from $65-275\ \mu$ in diameter.

The spore-balls are made up of a large number of light-colored spores. These have a slight violet tint and are enveloped by a

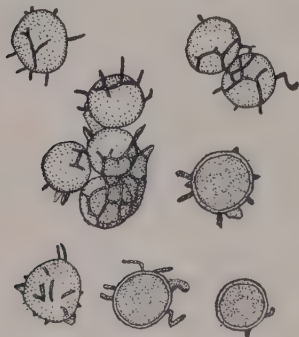


Fig. 1.

very thin outer coat provided with evident dark winged reticulations or wrinkles which firmly glue the spores together into the balls and give these their dark color. Upon the rupture of the spore-balls through pressure, these coverings are more or less broken showing on the spores as reticulations or spine-like processes or even becoming entirely detached. The spores (fig. 1) are subspherical, $8-11\ \mu$ in diameter (exclusive of the processes) and resemble closely

those of *Tolyposporium bullatum* on *Panicum Crus-galli* but are not angular. The character of the infected ovaries of the latter species is also quite distinct, though this is a character that is perhaps more dependent on the host than on the fungus.

Attempts to germinate this smut were successful only in the cultures kept in the incubator, this being about 36°C . Germination, when successful, generally began by end of second day. In water a septate pro-mycelium several times the length of the spore and about $2.5\ \mu$ wide was developed which generally became empty of protoplasm at the apex or at the base and frequently developed a prominent lateral branch. Very often the germ-threads broke up into joints or became separated from the spore by the gelatinization of the empty base. The threads were finally emptied of protoplasmic contents by

the production of lateral sporidia, a few at a time, which readily fell off in the water and did not while attached or afterward reproduce themselves to any extent by budding. The sporidia were quite variable, oblong with ends somewhat acute, and chiefly 6–12 by 1–2.5 μ . In solid nutrient media the germination of the spore-balls, when successful, was much more luxuriant, so that multitudes of more vigorous and connected sporidia were formed on the promycelia and were eventually extended further out into the medium by radiating threads, which at intervals gave rise to them, sometimes there being developed a series of distinct groups of connected sporidia though more likely through luxuriant budding these were all fused together as a common mass surrounding the spore-ball. Cultures of the sporidia act in much the same way.

In a search at South Billerica later in the month for plants of *Eriocaulon septangulare* that contained seeds which could be used for infection experiments with the *Tolyposporium*, it was found that all of the plants then at this locality were infected with a smut that was different from that collected at Ellis. Upon examination this proved to be a new species of *Ustilago*. The infected heads were smaller than those containing the *Tolyposporium*, but like that fungus the smut was found only in the ovaries of the pistillate flowers. In this case, however, there were occasionally found ovaries that had matured their seeds. The infected ovaries are somewhat smaller than those infected by the other smut, are oval in shape and generally broader than long, being about 0.75 by 1 millimeter. They are more decidedly two lobed and being quite dark colored are more apt to be seen by the naked eye. Neither are they so easily ruptured and when broken open disclose a tightly packed mass of dark olive spores. In one case a head was found that contained both smuts. The two, however, are readily distinguished with the aid of a hand lens when their characteristics have been learned. The spores of the *Ustilago* (fig. 2) are quite different from those of the *Tolyposporium*, being irregularly polygonal to sub-spherical

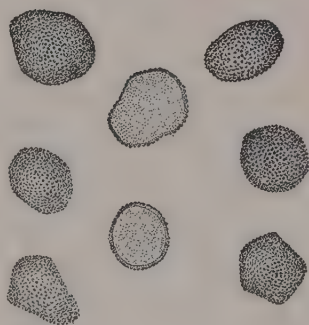


Fig. 2

or occasionally more elongated, much darker, prominently verruculose and $9-15\ \mu$ in diameter.

This *Ustilago* was only germinated in water in the incubator and was found to produce usually a four celled pro-mycelium about $3\ \mu$ wide and four or five times as long as diameter of spores. This produced terminal and lateral sporidia, which fell off before others were produced. Sometimes the germ-threads became more elongated, septate and empty at base and had a tendency to restrict the protoplasm to several places in the thread from which the sporidia were sprouted off, sometimes two or even three standing side by side. Such threads are apt to become detached from the spores and break up somewhat into joints. The sporidia vary considerably, generally being oblong in shape and in size about $6-12$ by $1.5-3\ \mu$.

The writer is indebted to Professor Thaxter for aid in the study of these smuts and expects to treat more fully of their life history in a paper on some American Ustilagineae that is in preparation. The drawings of the spores of the two smuts as given here are magnified about 900 diameters. The specific characters may be given as follows:

Tolyposporium Eriocauli, n. s. Sori greyish, oval, somewhat two-lobed, $1-2$ mm. in length, easily ruptured; spore-balls firm, black, perfectly opaque, irregularly oblong to subspherical, frequently somewhat angled, $65-275\ \mu$ in diameter; spores sub-spherical to spherical, light-colored, adhering together by dark winged folds which on rupture of balls show as reticulations or spine-like processes or become entirely detached, $8-11\ \mu$ in diameter exclusive of processes.

Inconspicuous in ovaries of pistillate flowers of *Eriocaulon septangulare* With., Ellis, Massachusetts.

Ustilago Eriocauli, n. s. Sori black, oval, very distinctly two lobed, usually about 0.75 mm. long by 1 mm. wide, firm, not easily ruptured; spores tightly packed together in a dark olive mass, irregularly polygonal to sub-spherical though occasionally more elongated, prominently verruculose, $9-15\ \mu$ in diameter.

Inconspicuous in ovaries of pistillate flowers of *Eriocaulon septangulare* With., South Billerica, Massachusetts.

CAMBRIDGE, MASSACHUSETTS.

A NEW NORTHERN EUPATORIUM.

EDW. L. GREENE.

E. boreale. Stout, erect, 2 feet high or more, glabrous except as to the inflorescence: leaves ample, very thin, dark-green, feather-veined, the veins not light-colored, 3 or 4 inches long, often 3 inches broad toward the base, broadly subcordate-ovate, abruptly acuminate, coarsely and evenly serrate, the serratures 20 to 25 on each side, some of the larger with a secondary tooth; petioles $\frac{3}{4}$ to $1\frac{1}{2}$ inches long, somewhat ascending: cymes terminal, but with one pair from the axils of the uppermost leaves: peduncles and pedicels rather densely pubescent, but involucre glabrous, their bracts thin, only obscurely striate: tips of the corolla-teeth somewhat hairy: achenes dark-brown, sharply thin-angled, the angles of those of the outer series remarkably setose-hispidulous, the surface glabrous.

This is a proposed segregate from the *E. ageratoides* of recent authors, and seems to form, in New England and northward, the bulk of what passes for that species. The plant of Maryland and Virginia which I take for the true *E. ageratoides* is very different, exhibiting a much firmer leaf texture, the leaves distinctly cordate and with a somewhat falcate acumination, the whole of a decided yellow-green color, the veins almost white. And this plant is not only pubescent throughout, even to the involucre, it is leafy mostly about the middle of the stem, and the cymes are rather amply paniced above the leaves. It is such a plant as this, with paniced inflorescence and distinctly cordate leaves that the Cornutian figure calls for; and that old author, in his text, distinctly mentions the light-green hue of the foliage. The achenes in this are perfectly glabrous, as in all other Eupatoriums of this group except *E. boreale*. Good herbarium specimens of this New England plant have been distributed by Dr. Robinson from Jaffrey, N. H.; others are in various herbaria from the White Mountain region. It is in the Canadian Survey Herbarium from Bass River, Kent Co., New Brunswick, collected by Fowler, while the southernmost station from which I have seen a specimen is Ipswich, Mass., the specimens distributed long ago by Oakes.

Mr. Fernald's No. 57, from along the St. Johns River, Maine, is

a plant which I should not refer here. It is in some points more like *E. ageratoides*. Its foliage is light-green, the veins also whitish, the serratures of the leaf margin are small, and there is a sprinkling of almost scabrous hairs on both faces of the foliage; but the specimen seen by me is not in fruit, so that the character of the achenes can not be made out. It is a plant which should be investigated.

The only published description of an *Eupatorium* to which *E. boreale* is somewhat near to answering is that of Poiret's *E. Fraseri*. But that is to be a plant with a paniced inflorescence, the whole herb perfectly glabrous throughout; and its habitat is Carolina. There are other discrepancies also; but the outline and indentation of the leaf, as shown in La Marck's fig. 4 of Plate 672, suggests a possibility of identity between the two. Yet, upon such crude figures as this, nothing can, with anything approaching certainty, be established; and, after long hesitation, and careful study, I have thought it best to call attention to this northern plant under a new name, rather than to call it *E. Fraseri* with double or triple question marks.

CATHOLIC UNIVERSITY, Washington, D. C.

SOME OBSERVATIONS ON ORCHID FRAGRANCE.

A. LEROY ANDREWS.

By no means the least of the factors entering into the great problem of cross-fertilization in flowers is the matter of fragrance or other odor serving as one means of attracting insects and securing their co-operation in the plant's struggle to perpetuate its kind. Singularly enough comparatively little scientific attention has been given to this important feature, investigations along the line of insect-pollination tending rather to the subject of interesting mechanical and chemical contrivances, to coloring, nectar-receptacles, honey-guides, etc.

It is not my purpose here to enter into any considerable discussion of the subject, but simply, by way of a suggestion, to note the results of careful observations upon our native orchids. The orchid, whose sole serious purpose in life seems to be self-perpetuation, presents unexcelled opportunities for the study of anything connected with cross-fertilization. We may reasonably expect it then to illustrate well the various facts of flower-fragrance and its relations to insects.

Of course we must bear in mind that in all probability odors imperceptible to the human sense of smell exist, which may possess for the small insect the very greatest attraction, and the tiny, unattractive *Microstylis* may be to the little gnat a perfect censer of fragrance; this probability does not, however, render valueless a classification of odors from the human standpoint.

Our natural, primary division would distinguish the distinctively agreeable from those not distinctively agreeable which we may term by way of contrast disagreeable. Laying aside individual eccentricities of like and dislike it will be readily seen that all odors will fall pretty definitely into the one or the other class. The disagreeable I would subdivide into the positively disagreeable, i. e., those of the carrion or other similar scent, the purpose being the attraction of flies by the suggestion of the presence of carrion, and the negatively disagreeable, i. e., those which may be called disagreeable from the lack of any agreeable quality, faint, oily, pungent smells, etc., probably attractive to some kind of insect, or possibly incidental or serving some other purpose. The agreeable I would similarly subdivide into those possessing the peculiar, distinctive flavor which we denominate perfume or true fragrance, and those characterized by a merely sweetish odor, one in no way distinct nor justifying the name perfume or fragrance, simply a suggestion of the presence of nectar.

The plants, particularly the roots, of all our terrestrial orchids possess a characteristic odor described by Mr. Baldwin (*Orchids of New England*) as "musky," which can hardly be called pleasing except for the associations which it always suggests, but which, as being also present in the flowers of certain species like *Habenaria orbiculata* habitually fertilized by night-moths, undoubtedly plays a part in the attraction of nocturnal insects.

Of the carrion odor and its relatives we have no examples in our orchids, though several tropical species display it in a very marked degree.

As negatively disagreeable I would mention *Cypripedium pubescens* whose "heavy, oily odor" noted by Burroughs is well known and furnishes an easy mark of distinction between it and the closely related *C. parviflorum*. One may sometimes detect an unpleasant, penetrating odor in *C. acaule*. Here belongs *Goodyera repens* var. *ophioides* which exhales a characteristic, pungent odor wholly different from that of *G. tessellata*.

Those orchids which are slightly sweet, but scarcely enough so to be termed fragrant in the ordinary sense, include *Cypripedium acaule* and *C. spectabile* with possibly *Orchis spectabilis*. I would insert also *Goodyera tessellata* in which a sweet, pleasant scent is readily noted. Another mark of this species, that I have not seen elsewhere mentioned, is a pinkish tinge almost invariably present in the flowers and sometimes of a very pronounced shade.

Naturally the greatest number of species belong to the fragrant division and it is interesting to observe the disagreements in the attempts of different botanists to describe them. I have already mentioned *Cypripedium parviflorum* whose peculiar, almost sickishly sweet fragrance distinguishes it from *C. pubescens*. Of the *Habenarias* *H. dilatata* claims our admiration for an unusually strong and very sweet, but characteristic fragrance, which would seem to indicate a wide difference between it and *H. hyperborea* which is scentless. Kraenzlin, however, in his recent great work on orchids (*Orchidacearum Genera et Species*) restores it to its old place as a variety of *H. hyperborea*. Baldwin complains because Gray referred to *H. psychodes* as "fragrant" and contradicts him with the statement that all the specimens which he had found had a rank smell. Kraenzlin describes them as "*suaveolentes*" and "*wohlriechend*." The truth of the matter I find from my own experience and from experiments with others is this: the odor, which resembles no other with which I am acquainted, at first always impresses one as rank, nauseating, disagreeable; to one persisting, however, it becomes very attractive, and the remembrance of it remains with one a long time. *Spiranthes Romanzoffiana* and *S. cernua* resemble each other in a very pronounced fragrance, though I have found apparent variations of the latter (RHODORA, I, 110) which were characterized along with other differences by an entire lack of fragrance. *Arethusa* and its relatives all exhale a very delicate violet fragrance. Baldwin takes exception to the statements of Chapman, Goodale and Burroughs that the *Arethusa* is fragrant, as also to those of the last-mentioned writer and Meehan concerning the fragrance of *Calopogon pulchellus*, though admitting that quality in *Pogonia ophioglossoides*. Thoreau on the other hand refers with the greatest disgust to the disagreeably "snaky" odor of the *Pogonia*.

I have found the following to be true of both the *Pogonia* and the *Calopogon*, and suppose that the case is the same with the *Arethusa*,

but have not had the same opportunity of examining fresh blossoms of the last. The early blooms of both *Pogonia* and *Calopogon* are fresh, clear and vivid in coloring, and possess very perceptible and very attractive perfumes, similar, but of slightly different flavors. A later visit to their homes shows them in much greater numbers, but lighter and faded in color, and with no sign of fragrance. This is true at the later date of even newly-opened blossoms. In the freshly-opened flowers of still another species which I have nowhere seen described as scented, *P. verticillata*, I find a very delicate fragrance faintly suggestive of the odor of *P. ophioglossoides*. The species of the greenhouse display similar characteristics, and will fall readily into the same classification.

These few fragmentary remarks touch upon a subject which to me seems of peculiar interest, and with which are connected some of the pleasantest recollections of many a collecting trip.

THETFORD, VT.

NOTES ON THE FLORA OF WOODS HOLE, MASSACHUSETTS.

HUBERT LYMAN CLARK.

THE following notes are based on observations made during August, 1895, July and August, 1899, and part of July and August, 1900, while the writer was engaged in biological work at the Laboratory of the United States Fish Commission. The village of Woods Hole is situated on a strip of ground between Vineyard Sound and Buzzards Bay, and, southwestward from the village, this is extended as a long and narrow tongue of land known as Penzance, and occupied by a few handsome summer residences, each surrounded by extensive lawns and more or less numerous flower-beds, the presence of which doubtless accounts for some of the interesting "escapes" noted below. These chance introductions seem to be confined chiefly to two widely separated spots, one on the Buzzards Bay side, the other on the Woods Hole side of Penzance.

Northward from Woods Hole the land broadens and becomes considerably diversified, containing some extensive woods, several ponds, and at least one cedar swamp. Since 1895 the increased popu-

larity of Falmouth (of which Woods Hole is a part) as a summer resort, and the corresponding decrease in the amount of neglected and waste land has brought about some changes in the flora, some species once common having become rare, while many new ones have been introduced. It has seemed worth while to publish these notes, not only to record the introduced forms, but also several species not previously reported east of Rhode Island. While the geographic position of Woods Hole is such that the occurrence of these species is by no means surprising, it is none the less worthy of note. It will be interesting to observe how many and which of the introduced species persist. The plants marked with an asterisk (*) were kindly identified for me at the Gray Herbarium.

Bromus hordaceus L. Not rare along roadsides.

Bromus tectorum L. Found once, in 1899.

Scirpus olneyi Gray. Abundant in some of the salt marshes along the Sound between Woods Hole and Falmouth.

Habenaria clavellata Spreng. (*H. tridentata* Hook.) A single small specimen of this orchid was found on the edge of the salt marsh between Eel Pond and Buzzards Bay.

* *Chenopodium anthelminticum* L. Found August 9, 1899, at a dumping place on Penzance, but not observed in 1900.

* *Tetragonia expansa* Murr. Growing with the preceding in 1899, but not found in 1900.

Myriophyllum pinnatum (Walt.) B. S. P. (*M. scabratum* Michx.) Not rare.

Dianthus barbatus L. Found on low waste land on Penzance in 1900, not previously noted there.

Lunaria annua L. Found once in 1899 in a waste place beside a woodland road.

Genista tinctoria L. While not seen at Woods Hole this species occurs across the "Hole" on Naushon Island.

Cytisus scoparius L. Common in the field back of the Fish Commission work-shop, where firmly established.

Foeniculum foeniculum (L.) Karst. (*F. vulgare* Gaertn.). Found at a dumping ground on Penzance in 1899 and persisting at the same place in 1900.

* *Hypochaeris radicata* L. In lawns on Penzance in 1899 but not found there in 1900. It has also been noted in a lawn at Tempest Knob, Wareham in 1899.

Centaurea cyanus L. Found on waste land on Penzance in 1899 and more abundantly in 1900. Apparently established there.

Helianthus petiolaris Nutt. Waste land on Penzance in 1899 but not found in 1900.

* *Dahlia coccinea* Car. Common on waste land on Penzance in 1899 and also abundant in 1900. Apparently established there. Some plants were found in 1900 with rays uniformly dark red.

* *Coreopsis lanceolata* L. By a roadside in Falmouth and once on Penzance in 1899 but not seen in 1900.

OLIVET COLLEGE, Michigan.

CALLITRICHE AUSTINI IN SOUTHWESTERN CONNECTICUT.

E. H. EAMES, M. D.

THE interesting but decidedly inconspicuous *Callitriche Austini* Engelm. is found sparingly within a few miles of New Haven (Orange), thence westward, usually in small quantities and at infrequent intervals, fully twenty miles. In Fairfield there are several colonies covering from one to three square rods, approximately.

It seems to prefer the damp earth of little used cart-paths or old roads, in woods or partial shade along their borders, and but little elevated above adjoining, or at least not distant, salt marshes. Occasionally it is so situated that every heavy rain will submerge it for a time, but the ensuing mud, while not at all unfavorable to the growth of the plant, soon settles to a moderate degree of moisture. From its habit of hugging the earth in such places, it is not rarely covered with mud during the subsidence of turbid waters, although its growth is not materially affected thereby.

Search for it in early June has usually been disappointing, whereas, by July 1 it may be seen in flower sparingly, and all through the month in increased quantity. Fully mature dull black fruit may be found in the middle of the month, while a few days more suffice for an abundance of it; even well into August, in most favorable situations, it still clings to the crumbling or decaying stems.

The height of its season seems to be the last two weeks of July, or until the burning heat of midsummer. At that time it might be

profitable for observers farther east to make careful search for this species so little known in our New England flora.

A seemingly overlooked record for this plant is that of the late Prof. L. N. Johnson,¹ who observed it in the sand along the edge of Mill River, near Samp Mortar Rock, Fairfield. This station is several miles inland and at an elevation of about twenty-five feet. Within my own experience it is confined to the coastal plain, and never in strictly sandy soil.

BRIDGEPORT, CONNECTICUT.

COLLECTING SEAWEEDS IN THE TROPICS.

[THE conditions under which collecting must be done vary much in different regions, and perhaps in no department is the difference more marked than with algae. The following notes, though not an addition to our knowledge of the botany of New England, may yet be of interest to New England botanists. They are in a letter from Mrs. C. E. Pease of Malden, describing the experiences of herself and her sister, Miss Eloise Butler of Minneapolis, Minn., on visits to the island of Jamaica, the chief object of the visits being the collection of algae. — F. S. C.]

SOMETIMES the weeds were at long distances from the shore, yet growing in shallow water in eel grass or on coral reefs and ledges. Most of our seaweeding was done from boats rowed by two or three strong experienced boatmen. We would be rowed out to the reefs or to the shallow places overgrown with grass, the water even there being up to our waists; then jump from the boat into the water, to fish about for our weeds. Of course we always wore bathing suits while seaweeding, and boy's thick hip rubber boots. On the reefs or by the ledges the waves were often strong enough to take us off our feet. Then we would cling closely together, one holding on to the other while she plunged in for the weeds. Even then we would sometimes be washed from our footing. The boatmen would be busy keeping the boat from being dashed on the rocks, and stand ready to assist us back into the boat, often with the greatest difficulty.

Even if the weeds grew near land, often the shores were so precipitous that to reach the weeds we must row to them.

Avrainvillea longicaulis, at Montego Bay, grew embedded in mud among eel grass in shallow water near a small island consisting of a

¹ Bull. Torr. Club, xix: 89.

mangrove swamp. It was discovered by the sense of feeling as we were digging in the mud among the eel grass roots for *Caulerpa*. We were continually feeling through the thick soles of our heavy rubber boots, a sensation as of stepping on drowned kittens. With fear and trembling we put our hands down to investigate, and pulled up the curious fleshy weed somewhat resembling a downy, swollen *Udotea*. The plants harbored numerous worms and other small sea animals.

At Port Antonio was our happy hunting ground in 1894, a coral reef running out from the base of a steep bluff. The water was extremely shallow out some distance. Perhaps we had half an acre of safe wading. We did not consider it safe to wade where we could not see the bottom, owing to sharks, octopi, etc. At this place we waded out to where the surface was jagged and rocky, the water about to our waists. At this depth we found *Caulerpa clavifera* growing like lovely little clusters of green grapes, in big soggy masses. Here also were clumps of all those limy things, *Halimeda*, *Amphiroas*, *Galaxauras*, *Cymopolias*, etc. They followed inshore, and with them upon the rocks were those green, warty, potato-ball-like *Dictyosphaerias*. Nearer the shore the water flattened out to nothing, and the bottom was sand, like powdered shells. Most of the plants mentioned dropped out, but *Caulerpa ericifolia* and '*C. plumaris*' covered the bottom, as club mosses grow in the woods. Such a pretty sight! Day after day we searched this reef for the "Mermaid's Shaving brush" you had told us we would most likely find, but were giving up in despair, and were leaving the water for the last time when just at the shore, the water barely deep enough to cover them, I noticed peculiar little raised mounds in the sand. With my foot I brushed them over and revealed the *Penicillus capitatus*, so long searched for. They grew as abundantly as seedling evergreens in a neglected Maine pasture lot, and we hastily brushed the sand aside and gathered as many as we could carry.

WEBERA PROLIGERA IN AMESBURY, MASSACHUSETTS.—I have been much interested of late in the study of those mosses which do not multiply themselves alone by the agency of spores, but by means of vegetative growths serving the same purpose. It is astonishing how abundant these plants will become in regions where it is almost impossible to find the least sign of fruit. There is a small brook in this town about a mile in length, flowing through sandy land

and emptying into the Merrimac river. For some distance from the head of this stream the banks are covered with various mosses, but I have never found any of the *Webera* group, the brook is then joined by another little rivulet which has cut for itself a channel in the live sand some thirty feet in depth. These banks of wet sand are densely covered with *Webera prolifera* (Lind.) Kind. From this place on, both banks of the brook are covered with this moss, although hardly any fruit can be found anywhere. It is easy to see how this wonderful multiplication is brought about, for in the autumn one can find plenty of the peculiar bulbils, which grow on the stem of this moss near its apex, but in the spring these growths are mostly gone. In the winter season the banks are covered with ice and snow, which collect the bodies, carry them along the stream and deposit them in the mud farther down, thus producing plants all along. — J. W. HUNTINGTON, Amesbury, Massachusetts.

TWO WOOL-WASTE PLANTS AT LAWRENCE, MASSACHUSETTS. — In connection with the article in the February number of the RHODORA by Mr. Emile F. Williams noting the finding of two species of *Erodium* in Tewksbury, the following may be of interest.

On June 14, 1900, I found growing within two feet of a pile of wool dust at the Arlington Mills, Lawrence, a single plant of *Clarkia pulchella*, Pursh, bearing one finely-developed flower. A careful hunt failed to reveal any more plants of this species.

This plant, if I mistake not, is a native of Oregon and California, and its presence here is easily accounted for, since the mill uses large quantities of so-called Territory wool from Oregon, Montana, Idaho, etc.

On June 15th I found in the same place a profusely flowering plant of *Gilia androsacea*, Steud., the lilac corolla with dark eye causing it to be easily identified. This, also, is a western plant, as are all of the genus.

There were also several species of *Compositae* not native, but I have not as yet identified them. The coming season I hope to make a study of this special locality. — JOHN A. COLLINS, Jr., Lawrence, Massachusetts.

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